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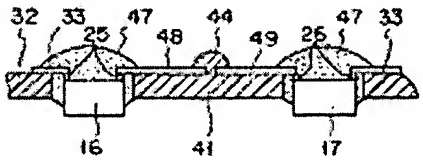
(54) **Substrate for mounting electrical components**

(57) The invention relates to structures for mounting electrical components.

A substrate supports a central unit (16) and a driving circuit of visualization device (17). A first connecting wire (48) going from the central unit (16) toward the driving circuit (17), and a second connecting wire (49) going from the driving circuit (17) toward the central unit (16), are formed on the substrate. Central unit (16) and driving circuit (17) are connected to the first and second connecting wires (48, 49) by means of an element (47) ensuring a hermetic coating. The end of the first connecting wire (48) is connected to that of second connecting wire (49) by a brazing material (44).

Application to integrated circuits boards.



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The present invention relates to a substrate for mounting electrical components such as high level integration circuits (or LSI circuits), and is used for example as integrated circuits boards.

In general, each integrated circuits board comprises a substrate on which a certain number of high level integration circuits, or LSI circuits (electrical components) are mounted.

When LSI circuits are used before being connected to each other, they are subjected to quality control before incorporating them in an integrated circuits board.

Following two methods are used for the quality control:

As it is shown in figure 10, in a first method, LSI circuits 101 are controlled in a state wherein they are mounted on respective substrates 102, and the substrates are then connected together.

In a second method, LSI circuits are mounted on a substrate (not shown here), and they are then controlled in a state wherein they are connected together.

However, the first method is disadvantageous from the fact that substrates 102 must be aligned with high precision insofar as they are connected after the quality control accomplishment of LSI circuits, and also from the fact that the structure comprising two connected substrates may easily be broken when it is curved or exposed to a sudden temperature change.

On the other hand, when LSI circuits are controlled under the

condition wherein they are connected together, the following problems appear:

Even if a defect is detected, it is impossible to determine the LSI circuit which is defective.

In addition, when LSI circuits are connected, one of the LSI circuits drives the other. To make a control in this state, it is necessary to have a signal line for designating a test mode, this fact means that it is necessary to provide an additional wire which is not used after the accomplishment of a chip production.

Moreover, programs are necessary for controlling one of the LSI circuits by means of the other, and to have at the output a control result. Furthermore, due to the fact that one of the LSI circuits controls the other, the time necessary for making a control is unavoidably long.

The invention purpose is to supply a substrate for mounting the electrical component which may be done without a precise alignment, and which allows one to independently control each of the electrical components mounted on the substrate.

To attain this goal, the invention provides a substrate designed to support the first and second electrical components, with an interval between them; a first conducting material, formed on the substrate, which extends from the first electrical component to the second electrical component; a second conducting material, formed on the substrate, which extends from the second electrical component to the first electrical component, and which has an end which is slightly separated

from the first conducting material; first connecting means which connect the first electrical component to the first conducting material and which connect the second electrical component to the second conducting material; and second connecting means which connect together the ends of the first and second conducting materials.

According to another aspect, the invention supply a substrate for automatically mounting components on tape, or TAB (Tape Automatic Bonding) substrate, supporting the first and second electrical components, with an interval between them, the first and second electrical components comprising electrodes; a first circuit formed with conducting material and printed on the TAB substrate, a first circuit extending from the first electrical component toward the second electrical component; a second circuit formed with conducting material and printed on TAB substrate, the second printed circuit extending from the second electrical component toward the first electrical component, and having one ends slightly separated from the first circuit; first connecting means which connect the first electrical component to the first circuit; and second connecting means which connect together the ends of first and second printed circuits.

Other characteristics and advantages of the invention will be better understood at the reading of description of the preferred embodiments, which will follow, provided as non-limiting examples. The description continuation is referred to annexed drawings wherein:

- Figure 1 is a plane view showing the central unit (UC) and a

driving circuit of the electroluminescent diodes (or DEL) mounted on a substrate printed in conformance with the invention embodiment.

Figure 2 is a plane view showing an integrated circuits board wherein the printed substrate is incorporated;

Figure 3 is an exploded view showing the internal structure of the integrated circuits board;

Figure 4 is a plane view showing the internal structure of an integrated circuits board observed from the side of its front surface;

Figure 5 is cross-sectional view showing a central unit and a driving circuit of electroluminescent diodes, which are mutually connected and mounted on the printed substrate;

Figure 6 is a plane view showing the connection between the central unit and the driving circuit of electroluminescent diodes which are shown in figure 5;

Figure 7 is an enlarged plane view showing a junction of the wires;

Figure 8 is an enlarged plane view showing a first junction of the wires;

Figure 9 is an enlarged plane view showing a second junction of the wires;

Figure 10 is a cross-sectional view showing a device with classical printed circuits board.

Now, let explain in detail the integrated circuits board of the invention with reference made to figures 1 - 9 which show an embodiment of the invention.

Figure 2 shows the integrated circuits board. This integrated circuits board is made as it is shown in figure 3. More precisely, in figure 2, reference 1 designates a front plate which comprises a magnetic track 2, a visualization window 3, a keyboard 4 and openings 5, through which protrude contacts 21.

A personal or professional information is recorded in track 2. Visualization window 3 displays for example a sale, a time limit or past professional data, when keyboard 4 is activated.

As it is shown in figure 3, a spacer 6 is placed under front plate 1, and it comprises an opening 7 aligned with the visualization window 3, as well as a set of openings 8 wherein the keys of keyboard 4 are adapted, and an opening 9 which is aligned with opening 5 of front plate 1.

Membrane switches 10 are placed under spacer 6, and they may be opened and closed by keyboard 4.

A flexible printed circuit substrate 11 is placed under switches 10, and it is connected to a principal printed substrate (TAB substrate) 12, as well as a battery 13. Membrane switches 10 and a liquid crystal visualization device 23 are connected to principal printed substrate 12. Visualization device 23 is aligned with the visualization window 3 of the front plate 1.

A plastic barrier 14 is placed under the printed circuit substrate, and it forms a peripheral part external to the integrated circuits board.

A rear plate 15 is placed under the plastic barrier 14.

As it is shown in figure 4 (figure 4 shows TAB substrate 12 viewed from the side of the rear plate), a central unit 16 which constitutes the first electrical component of an integrated circuits board having various clock, processing, etc. functions and a driving circuit 17 of the liquid crystal visualization device 23, making up the second electrical component, are mounted on substrate 12, by an automated connection for components placed on tape (which is called hereafter "TAB connection").

Printed circuit substrate 11 comprises in addition a network of capacitors 18, a quartz oscillator (electronic component 19), a plate type capacitor 20, contacts 21 and an antistatic element 22.

Contacts 21 protrude from the front plate 1, through opening 9 of spacer 6 and openings 5 of plate 1. Contacts 21 are connected to external terminals of an external device (not shown here), when the integrated circuits board is inserted into the latter.

Principal printed substrate 12 consists of a layer support 41, showing in the form of a flexible board or a rigid board, and it carries a printed circuit 32 consisting of a layer of conducting copper printed on the support, as it is shown in figure 5. Central unit 16 and driving circuit of the liquid crystal visualization device 17 are connected to circuit 32 which is formed with engraving and Sn or Au deposit, and this connection is made with a connection technique of internal conductors (or ILB for "Inner Lead Bonding").

As it is shown in figures 5 and 6, a copper layer is deposited

on the support of layers 41, and it is then engraved, to form the only element of the first and second connecting wires 48 and 49 and conductors 33. Each pair of the first and second connecting wires 48 and 49, which are mutually aligned, have their ends slightly separated from each other. Central unit 12 and the driving circuit of the liquid crystal visualization device 17 are connected with ILB connection on the layer support 41 having the structure described above. So, electrodes (protuberances) 25 and 26 of central unit 16 and driving circuit of liquid crystal visualization device 17 are soldered with thermocompression at a temperature of 500°C, to conductors 33, and they are coated with a coating element 47 ensuring the sealing. Afterward, central unit 16 and driving circuit of liquid crystal visualization device 17 are individually controlled. If it is determined that they operate correctly, the ends of each pair of first and second connecting wires 48 and 49 are connected together, with the help of brazing material 44 (second connecting means). Support of layers 41 is then cut according to cutting line 42, to form substrate 12.

As it was described above, due to the fact that central unit 16 and driving circuit of liquid crystal visualization device 17 are subjected to quality control, before wires 48 and 49 are connected together, these components may individually be controlled, and therefore in an usual manner, this fact considerably facilitates the control. Moreover, due to the fact that a set of central units 16 and driving circuits of liquid crystal visualization device 17 are supported

by the sole printed substrate 12, the resulting structure has a sufficient mechanical resistance for not to be broken, even when it is curved or subjected to a sudden temperature change.

Although ends of wires 48 and 49 are fixed with brazing material 44 in this embodiment, they may be fixed with a conducting adhesive, a conducting layer, a connecting wire ora connecting substrate.

In addition, the invention is not limited to this embodiment, and central unit 16 and the driving circuit of liquid crystal visualization device 17 may comprise wires 51 and 52 having the fork shape, connected one to the other as it is shown in figure 8. This structure facilitates and reinforces the connection of the ends of wires 51 and 52.

Moreover, as it is shown in figure 9, a slot 63 constituting a means designed to prevent the formation of a connection, may be formed between the pairs adjacent to the ends of conducting wires 61 and 62 of central unit 16 and the driving circuit of liquid crystal visualization device 17. This slot stops the flow of brazing material 64 which fixes wires 61 and 62, this fact prevents the pair of wires from being electrically connected to another pair of wires. The slot is a through hole that is formed by cutting the substrate.

It goes without saying that numerous modifications may be brought to the described and shown device and method, without exiting from the invention.

CLAIMS

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1. Substrate for mounting electrical components, characterized by the fact that it comprises: a substrate (12) designed to support first and second electrical components (16, 17), with an interval between them; a first conducting material (48), formed on the substrate (12), and extending from the first electrical components (16) toward the second electrical component (17); a second conducting material (49), formed on the substrate (12), extending from the second electrical component (17) toward the first electrical component (16), and having an end which is slightly separated from the first conducting material (48); first connecting means (47) which connect the first electrical component (16) to the first conducting material (48), and which connect the second electrical component (17) to the second conducting material (49); and second connecting means (44) which connect together the ends of first and second conducting materials (48, 49).

2. Substrate for mounting electrical components according to claim 1, characterized by the fact that each of the first and second conducting materials (48, 49) comprises a set of wires.

3. Substrate for mounting electrical components according to claim 2, characterized by the fact that it comprises in addition means for preventing a connection (63), which prevent the mutual connection of adjacent wires of the first conducting material in the form of wires (61), and which also prevent the mutual connection of adjacent wires of the second conducting material in the form of wires (62).

4. Substrate for mounting electrical components according to claim

3, characterized by the fact that means for preventing a connection comprise slot (63) which is placed between wires of each pair of adjacent wires of first and second conducting materials in the form of wires (61, 62).

5. Substrate for mounting electrical components according to claim 1, characterized by the fact that respective ends of first and second conducting materials (48, 49) comprise configurations in the form of a fork which are designed to interpenetrate.

6. Substrate for mounting electrical components according to claim 4, characterized by the fact that the slot comprises a through hole (63) which is formed in the substrate (12).

7. Substrate for mounting electrical components , characterized by the fact that it comprises: a substrate for the automated connection of components placed on tape, or TAB substrate (12), which supports the first and second electrical components (16, 17), with an interval between them, first and second electrical components (16, 17) having electrodes (25, 26); a first circuit (48) constituted with a connecting material and printed on the TAB substrate (12), this first circuit (48) extending from the first electronic component (16) toward the second electronic component (17); a second circuit (49) constituted with a connecting material and printed on the TAB substrate (12), this second circuit (49) extending from the second electrical component (17) toward the first electrical component (16), and having and end which is slightly separated from the first circuit (48); first connecting means (47) which connect first electrical component (16) to first circuit (48), and which connect the second electrical component (17) to second circuit (49); and second connecting means (44) which mutually connect the ends

of first and second printed circuits (48, 49).

8. Substrate for mounting electrical components according to claim 7, characterized by the fact that each of the first and second circuits (48, 49) comprises a set of printed wires.

9. Substrate for mounting electrical components according to claim 8, characterized by the fact that it comprises in addition means for preventing a connection (63) which prevent adjacent wires of the first circuit (48) from being connected to each other, and which also prevent adjacent wires of the second circuit (49) from being connected to each other.

10. Substrate for mounting electrical components according to claim 7, characterized by the fact that first and second circuits (48, 49) respectively comprise ends having fork shape configuration and which are designed to be interpenetrated.

11. Substrate for mounting electrical components according to claim 9, characterized by the fact that means for preventing an electrical connection comprise a slot (63) which is formed between wires of each pair of adjacent wires of first and second printed circuits (48, 49).

12. Substrate for mounting electrical components according to claim 10, characterized by the fact that the slot comprises a through hole (63) which is formed in the substrate (12).

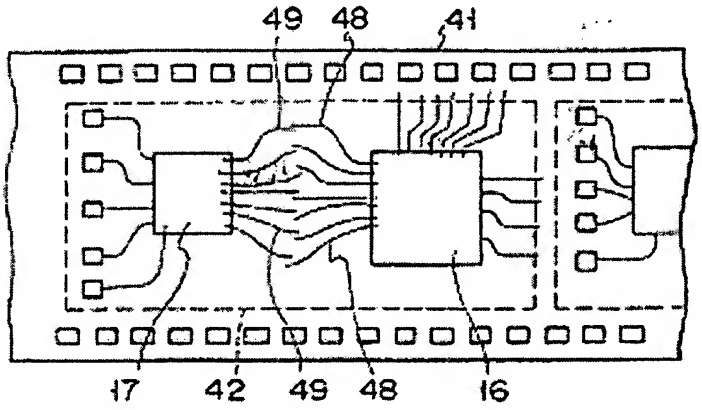
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FIG. 1

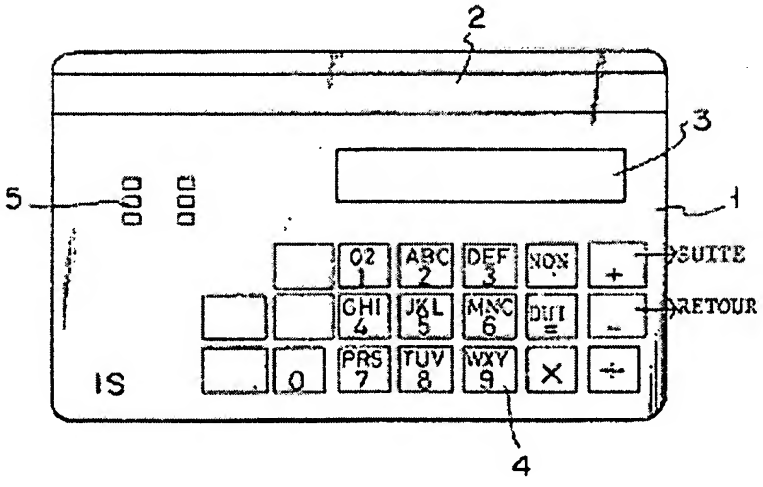
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FIG. 2

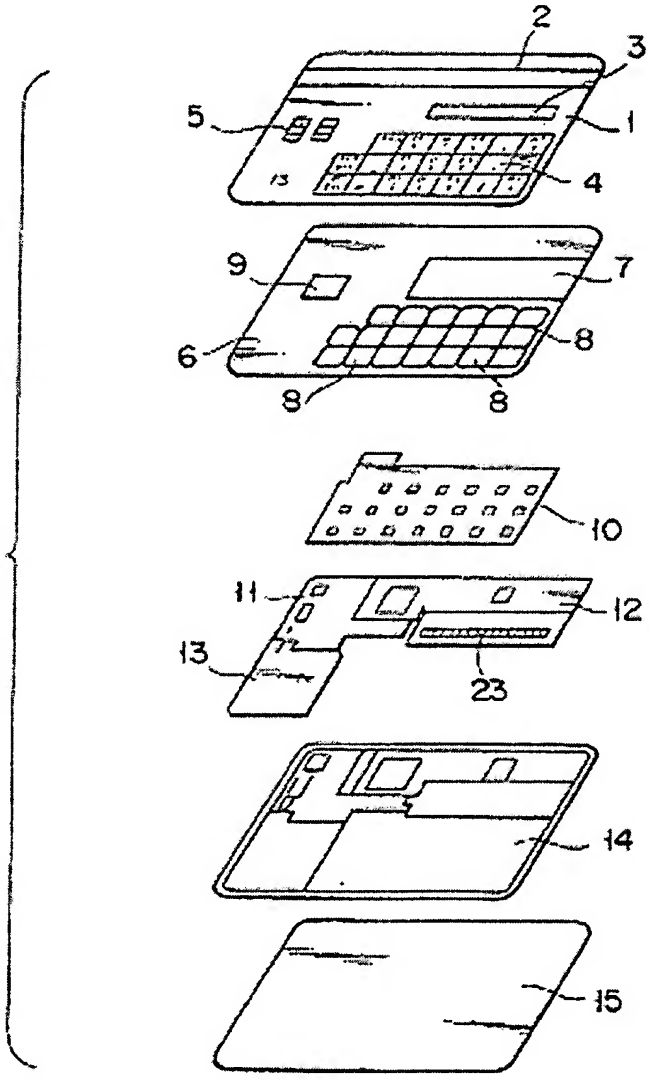

FIG. 3

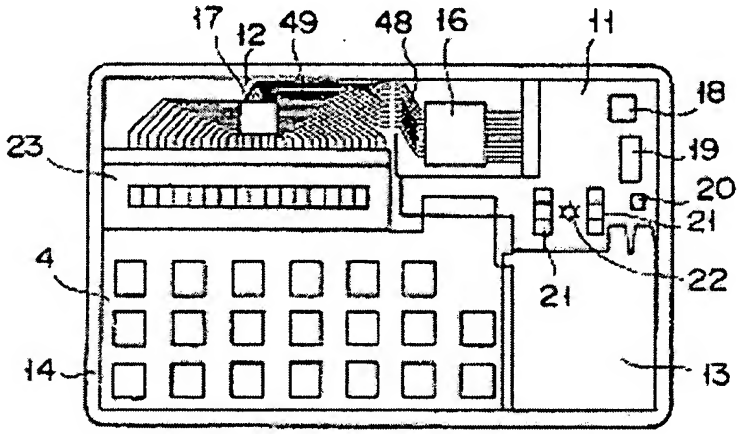
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FIG. 4

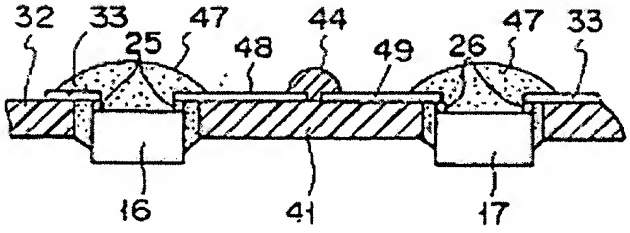
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FIG. 5

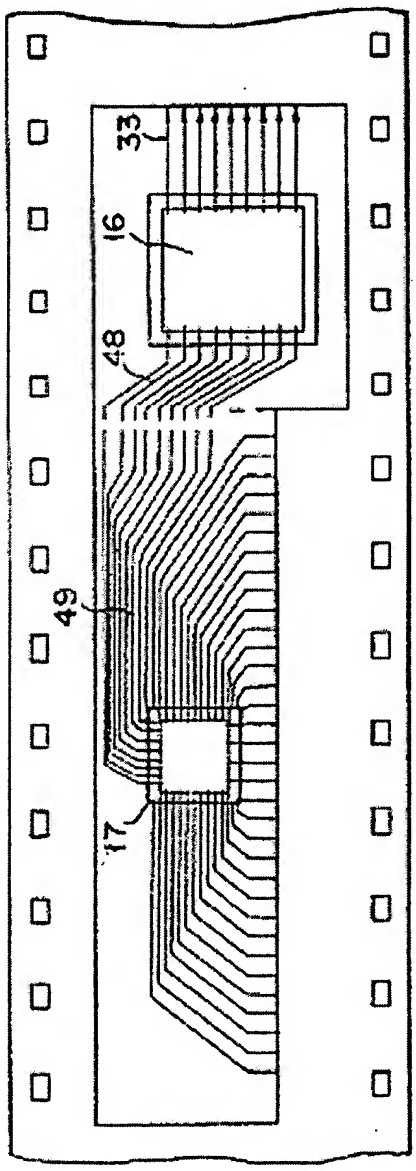

FIG. 6

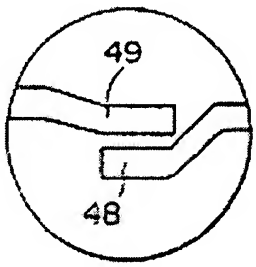

FIG. 7

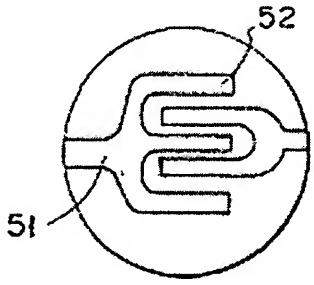

FIG. 8

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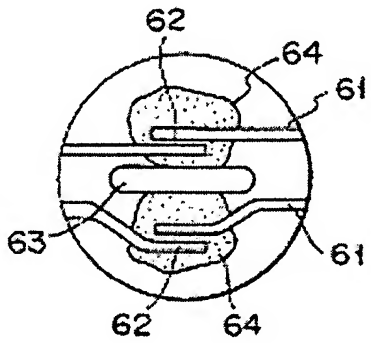

FIG. 9

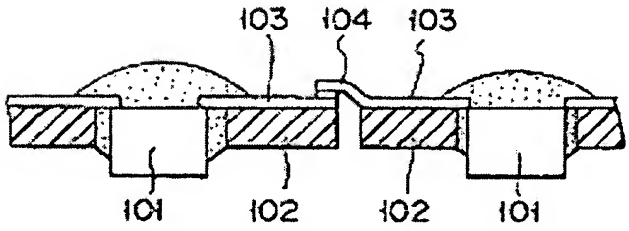

FIG. 10